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SUSTAINABLE DEVELOPMENT

The effect of the internalization of external costs on sustainable development

Report by the UNCTAD secretariat

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I. BACKGROUND

1. At the second part of its thirty-ninth session, the Trade and Development Board adopted decision 402 (XXXIX) in which it decided to consider a "theme or themes on sustainable development at the second part of its annual sessions".[1] At the first part of its fortieth session, the Board decided to consider at the second part of its fortieth session, as agenda item 4, the theme: "Sustainable development: the effect of internalization of external costs on sustainable development".

2. The purpose of this decision is to pursue the Board's follow-up to UNCED and to make a contribution to the intergovernmental consideration of this critical area, in which very little work has yet been done. Economists generally argue that the internalization of external environmental costs is a necessary step towards sustainable development. Methods for so doing, particularly when internationally traded products are involved, are still in the early stages of development and have not yet been widely tested. This topic is therefore at the cutting edge of research and debate in the intergovernmental community, and presents UNCTAD with both an opportunity and a challenge. This report is intended to present the issues involved and suggest possible directions for future consideration of these issues in UNCTAD.[2]

3. The phrase "internalization of external costs" is drawn from Principle 16 of the Rio Declaration adopted by the United Nations Conference on Environment and Development in Rio de Janeiro on 14 June 1992.[3] In assessing, as required, its impact on sustainable development, the present report examines the internalization of external costs in the context in which Principle 16 sets it, which requires focusing on economic instruments, on the approach that the polluter should in principle bear the cost of pollution, on avoiding distortion to international trade and investment, and above all on promoting the public interest. Moreover, this report will strive as far as possible to anchor its arguments in the Rio Declaration.

4. By definition, an externality is an effect of one firm's or individual's actions on other firms or individuals who are not parties to those actions. The effect can be negative or positive and create an uncompensated cost or a benefit, respectively, to non-parties.[4] The issue posed by the Board concerns the internalization of external costs only, not external benefits. This report therefore refrains from discussing positive externalities like the services to the world community rendered by reservoirs of biological diversity or by forests as carbon sinks, except in so far as external economies are an inseparable mirror image of external costs. The issue of adequate compensation for the provision of environmental "goods" is, however, of as great importance as that of finding ways to avoid the generation of environmental "bads", and is therefore worthy, in the secretariat's view, of examination in UNCTAD at some future time.

5. It should moreover be noted at the outset that internalization is but a means, the objective being to avoid external costs. An important argument for internalizing external costs is precisely to provide the agent responsible for causing the cost with an incentive to reduce or eliminate it. Avoidance can, however, sometimes be achieved without internalization, for example by taking preventive action, or by eschewing dangerous activity. This set of policy options, though of obvious practical importance, is not treated in the report because of the limited mandate given to the secretariat for the present session of the Board.

II. INTRODUCTION

6. This report takes as its basis the definition of sustainable development

given in the Brundtland Report[5]:

> Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts:
>
> - the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and
> - the idea of limitations imposed by the state of technology and social organisation on the environment's ability to meet present and future needs.

Sustainable development is thus intended to direct economic activity towards the satisfaction of present economic and social needs, without thereby jeopardising the bases for future need satisfaction. The emphasis on needs places equity at the centre of the concept of sustainable development, just as the emphasis on keeping options open for future generations requires focus on the wise stewardship of the earth's resource base for future economic activity, of which one aspect is the conservation and management of environmental assets traditionally regarded as free goods. Concern for the future also requires a continuing assessment of the balance between present and future needs and options.

7. From an analytical perspective equity, whether intra- or inter-generational, involves considerations of distribution with which by its nature the market cannot deal: even a perfect market will allocate resources efficiently only from the perspective of the given initial distribution of those resources. It is a matter for the community in question to consider whether that initial distribution is satisfactory and if it decides that it is not, to adjust it according to agreed principles. The present report is not the place to discuss this fundamental issue, which was omnipresent at Rio and led to the adoption of the Rio Principles to which this report refers. In particular, Principle 3 of the Rio Declaration[6] refers to inter-generational equity, and Principle 5[7] to intra-generational equity considerations. In this connexion, reference should also be made to work undertaken by the UNCTAD secretariat with the support of the Government of the Netherlands on what might be called "fair principles" for sustainable development.[8]

8. Because sustainable development is a development concept, it requires economic growth in places where essential needs are not being met. Sustainable development thus gives priority to the urgent present needs of the poor, seeking to do away with poverty, not just pollution. This creates a tension between the rich and the poor which is encapsulated in a single measure of what is needed to achieve sustainability: population times per capita resource consumption. Given the existing distribution of incomes in the developing countries, as modest a development goal as merely to double the real income of the bottom quintile (20%) of the population would require fully 70 years if per capita income in the developing countries grew at but 1% per annum. However, at a 3% rate of growth, such a doubling would require "only" 25 years.[9] Governments in the developing countries are unlikely to aspire to less than this nor would ethical considerations countenance less. Given the expected rate of growth of population, to meet these minimum aspirations would thus require growth rates in aggregate national developing country income on the order of 5.5%, implying that economic activity in the world as a whole would have to rise by at least 5-fold over the next 50 years.[10]

9. Such an immense increase from a level already judged by many observers to be straining existing ecological capacities would seem likely to imperil the long-term security of the planet's ecological base. The challenge for the developed countries is thus to restore an already degraded environment while maintaining, as much as possible, lifestyles (but not necessarily particular modes of consumption) and productive activities (but not necessarily particular products or production processes). For developing countries, the no less daunting

challenge is to eradicate poverty and increase employment and production whilst preserving and protecting the environment. In addition, concerted international action will need to be undertaken in order to address intra-generational equity considerations of a domestic and of an international nature, of which the appropriate sharing of the costs and benefits of sustainability constitutes one of the main components.

10. "Wise stewardship of the earth's resource base" requires a focus on public (i.e., non-excludable) or open access (i.e., potentially excludable) goods[11] such as clean air, clean water, biodiversity, etc.. For too long, these assets have been treated as free goods in the economic production process and consequently over sed in production activities, depleting these resources and generating external environmental costs.[12] Abstracting from the distributional considerations raised earlier, if policies and markets were perfect, as in the textbook models, these external costs would be internalized, as would the external costs associated with the fact that many resources are unowned or unpriced, whilst others are priced too low or their depletion subsidised. It is the "dissociation between scarcity and price, benefits and costs, rights and responsibilities, and actions and consequences" which needs to be addressed if sustainable development is to be assured.[13] These are issues of policy, many of the problems arising from policy-induced distortions (known commonly in the economics literature as "policy failures"). The correction of such distortions (or "failures") constitutes the essence of the internalization issue with which the present document deals in the following chapters.

11. As for all policy measures, those relating to the environment are developed in the context of the tendency of political opinion to concentrate on only a restricted set of issues at any one time. Narrowly focussed action can result in shifting external costs rather than internalizing them.[14] There is a broad similarity here with the theory of the second best in economics, which states that if it is not possible to meet every single condition of competitive equilibrium, to strive to meet the remaining conditions may result in a worse state of affairs than departing from those remaining conditions. The parallel is that to internalize only a particular external cost may result in aggravating the total burden of external environmental costs or in shifting the burden from one social group to another or from one country to another. This does not imply that no action should be taken unless all costs have been internalized; rather, it means that efforts need to be made to establish a policy context in which environmental costs, rather than being externalised or shifted onto others, will instead be reduced or avoided altogether. Internalization measures, considered in chapter III below, can be a step in this direction if applied in the context of a comprehensive environmental policy.

12. To answer the question of the impact of internalization of external costs on sustainable development, it is first necessary to consider the various devices which might be used for such internalization, since the impact is likely to be different from instrument to instrument. The secretariat's modest purpose in the present report is to take the first step in this analysis by examining what instruments are available for internalization, and what are their characteristics. The problem of internalization is an extremely complex one, not only in terms of the identification of instruments to be used for its implementation, but also as regards the implications of such use at the international level and the need for strong internationally concerted action in this respect.

13. The regulatory (or "command and control") approach - in which the government sets environmental standards and designs regulations to ensure they are honoured[15] - has been the primary approach to environmental problems in most countries. Since there is a substantial literature on this approach, the secretariat has preferred in this paper to focus on a range of other instruments which can be used for the internalization of external environmental costs. Chapter III below first looks at the basic principles underlying internalization, focussing in particular on the issue of full cost resource pricing, with which

UNCTAD is particularly well placed to deal. It then addresses the nature of the various instruments for internalization at governments' disposal and their advantages or disadvantages. The chapter further deals, although in a very preliminary way, with a possible scenario for achieving the right "dosage" or policy mix of existing internalization instruments.

Box 1.

Types of external environmental costs

Global public good/open access external environmental costs

Global effects occur when an externality affects every inhabitant of the earth or has worldwide effects. The classic case is the emission of CFCs causing ozone depletion and affecting all humanity, or the use of fossil fuels and the destruction and non-replacement of forest cover causing atmospheric carbon dioxide concentrations to increase, thus threatening global climate change through the "Greenhouse Effect". In the same way, and since ocean fishing is available to all nations, open access over-fishing also constitutes a major global environmental externality.

Although the above-mentioned cases relate to present environmental effects, intertemporal external environmental costs are not only possible but likely since the benefits of decision-making today may accrue largely to the present generation while the costs accrue to future generations, whose costs are given less weight than those of the present generation. As an illustration, the latest estimates on global warming suggest that the global mean temperature will rise by approximately 0.3°C per decade. Unless stopped, this rise will have profound effects on future generations.

Transnational public good/open access external environmental costs

Transboundary external environmental costs occur when their impact seeps over from one country to another. An example is sulphur dioxide emissions from UK coal burning power stations causing acid rain in Scandinavia. The same is true with river water, when a river passes through several nations. As far as intertemporal considerations are concerned, here again, environmental costs such as the loss of amenity to future generations may not be sufficiently accounted for, even if international mechanisms limiting these emissions are established.

Local public good/open access external environmental costs

Air pollution in a city with little effects on other regions of the country, local pollution effects of inappropriate application of pesticides, over-use of forests due to ill-defined property rights and over-grazing due to ill-defined grazing rights, are all illustrations of local public good/open access external environmental costs. Over-grazing by cattle has been a severe problem in Botswana where much of the land is held in common. In many parts of the country, particularly the East, cattle stocking rates are well above the carrying capacity of the land. The intertemporal dimension of the problem is illustrated, for example, in cases of forests, timber or land clearance where the rate of extraction may be higher than justifiable, as the local area of forests left may be insufficient for the purposes of future generations in that area.

14. Finally, the international dimension of internalization, in particular in the presence of transborder and global external environmental costs, is addressed in chapter IV. The advantage of cooperative solutions is noted, and the search for existing or potential mechanisms aiming at achieving internalization, such as marketable permits and commodity-related environmental agreements, and their implications at the international level, are discussed. The essential role of trade as a vehicle for internalization, as well as, in this respect, the great potential of incentives for environmentally sound technology switching, are also examined. The secretariat's conclusions from the analysis are presented in chapter V, together with some suggestions for future work.

III. INTERNALIZING EXTERNAL ENVIRONMENTAL COSTS

A. The basic principles

15. A degree of international agreement has been reached on the basic principles according to which external environmental costs should be internalized. These principles were originally formulated in the OECD countries, but they have achieved global acceptance in the form in which they are reflected in the Rio Declaration, in Principles 7, 10, 15 and 16. The OECD has done most work on the "Polluter Pays Principle" (Principle 16 of the Rio Declaration), work supported by growing experience in application and by a body of literature evaluating that experience.

1. The Polluter Pays Principle

16. Principle 16 of the Rio Declaration states that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment. This raises the question of who is the polluter: is it the producer of the pollution or the consumer of the good or service who, through his or her demand, induced the producer to pollute? The OECD answer is : "from the point of view of conformity with the Polluter-Pays Principle (PPP), it does not matter whether the polluter passes on to his prices some or all of the environment costs or absorbs them".[16] It does however matter in terms of distributional effects: the more inelastic the demand for a product, the more an increase in cost can be passed on to the buyer; conversely, the more elastic the demand, the more the producer will have to absorb increased costs.

2. The Resource Pricing Principle

17. The PPP self-evidently focuses on pollution, whereas sustainable development goes beyond pollution to centre on equity, between generations but above all between rich and poor, its focus on the environment coming in the broader context of the proper use of resources. The failure properly to value scarce resources is the source of incorrect signals sent to decision-makers conveying, in turn, misleading information about resource scarcity and thus providing inadequate incentives for the management, efficient utilization and enhancement of natural resources. If these resources, which include among them all environmental resources, are to be allocated efficiently both in the present and in the future to those uses most effective in stimulating sustainable development, it is necessary that their prices should reflect the full range of the costs involved in using them, including the costs of the external effects associated with exploiting, transforming and using the resources, together with the costs of future uses forgone. This is what can be called the principle of full cost Resource Pricing (RP), which rests on the proposition that the beneficiary of the services rendered by a resource should meet the costs of providing them. If this principle is properly applied, prices will reflect the environmental costs to the community of satisfying marginal demands. Environmentally sound full cost resource pricing should include three sorts of cost:

(a) Firstly, it should include the various capital and operating costs, i.e. the direct costs of production. Subsidies are thus ruled out, as they amount to costs which the beneficiary externalises, and require payments by those who do not benefit from the use of the resource to those who do. More generally, whenever a beneficiary can obtain a good or service at less than its social opportunity cost, the principle of full cost RP is not respected, and adjustments need to be made.

(b) Secondly, full cost RP should include damage control costs, i.e., the costs of pollution prevention and control.

(c) Thirdly, it should also include 'user costs', a particular kind of intergenerational externality defined as any costs that the present use of the resource imposes on future users. With respect to exhaustible resources, user cost for any future period is the difference between the costs that users now face and those they would have faced had the resource not previously been used. More generally, it is the reduction in the value of a resource caused by using it as compared with not using it.

18. In practice, this full cost Resource Pricing principle seems to be very little applied, although its use would clearly be of great importance in avoiding the generation of external environmental costs. Thus, governments intervene in agricultural commodity markets through price support, agricultural taxation, export taxes and macroeconomic interventions. Whilst in the developed countries intervention usually seeks to keep domestic agricultural prices above world market levels,[17] in the developing countries, agricultural production is often influenced by interventions (including marketing boards) keeping domestic agricultural prices below world price levels. Both types of intervention may encourage producers to ignore the productive capacity of the land, with adverse consequences for sustainable development.[18]

19. Governments also under-price certain resources which may thereafter constitute inputs in production processes, either by providing them below their marginal cost, or by subsidizing private producers. This is particularly the case for prices of water, energy, pesticides and fertilizers, which are frequently set at less than the marginal cost to society, and even, in certain cases, less than the marginal cost of production, as for certain "below-cost timber sales". Because of such under-pricing, the resource is demanded in larger quantities than would otherwise be the case if marginal cost pricing was adopted. As a result, environmental damage occurs, either directly or indirectly, when these under-priced resources are used as inputs of production processes. This has both static and dynamic effects: resources are misallocated in the present, and are prematurely depleted, affecting future generations.

20. This type of policy-induced distortion is common in developed and developing countries alike. In developed countries, both subsidies in natural-resource based sectors and publicly administered resource prices that do not embody the full social cost of resource use are particularly relevant. As an example, subsidies are pervasive in the agricultural sector, where policies designed to secure self-sufficiency, promote food exports and increase farm incomes, are common in most OECD countries.[19] Water resources are another case in point where excessively low government administered prices for water resources continue to be the rule in a large number of these countries.[20]

21. In developing countries, price controls over natural resources are widespread. Although society experiences an overall loss of efficiency because of such control, food and energy prices are frequently subsidized in order to keep the price of essential goods low to benefit the poorest members of society. As well, and in order to encourage industrial and agricultural activity, the prices of fertilizers, irrigation water and energy are generally kept low. Whatever the objectives may be in intervening to keep prices below social (or even marginal private) costs, the cost of achieving these objectives can be very high,[21] and constitute a serious drain on government revenues, while the

resources so wasted could have been used for other purposes that could benefit poor populations equally well or better.

Box 2.

Water pollution in El Salvador and Costa Rica

The coffee processing industry makes extensive use of water: for transportation, for the removal of the skin and pulp of the coffee berry, and for the washing process. Water pollution and contamination has in consequence become a serious concern in countries like El Salvador and Costa Rica. The response to this concern has differed sharply in the two countries, however.

In El Salvador, charges for water use have been raised, and charges have been instituted for dumping contaminated water into the rivers. These internalization actions have prompted a positive change in the way water is used: water used in coffee processing is recycled; labour is used instead of water for such tasks as coffee selection; water collected after use in coffee processing is stored in pools, the surface residue skimmed off for use as fertiliser and the water itself chemically treated before being discharged.

In Costa Rica, by contrast, no attempts have been made to internalize the environmental costs of water use in the coffee industry: no incentives have been set in place to change production or consumption behaviour. As a result, rivers and water sources are more contaminated than those in El Salvador. Although water is more abundant in Costa Rica than in El Salvador, most of the surface water has been rendered unfit for any sort of consumption, necessitating the use of groundwater and acquifers, which are themselves vulnerable to chemical contamination.

Source: Segura, O.B. with J. Reynolds, "Environmental impact of coffee production and processing in El Salvador and Costa Rica", UNCTAD/COM/20 (a case study prepared for UNCTAD) August 1993.

22. Another policy-induced distortion which affects resource pricing arises when the economic rent earned from natural resource extraction and harvesting by private concessionaires is not sufficiently captured by governments through taxation.[22] The main illustration, whether in developed or developing countries, is the case of low or reduced rental rates on timber and fisheries.[23] This internalization failure exacerbates environmental destruction by: (i) creating super-normal profits which increase the rate of entry to the industry, as in the tropical logging industry; (ii) keeping the prices lower than the true private costs of resource extraction, which has, for example, created a situation in which high quality tropical timber is used for normally low-quality planking for construction purposes;[24] (iii) reducing government revenue below what it could have been with higher rents per unit of resource extracted and thus reducing investment in more sustainable management, such as the monitoring of concessionaires.[25]

23. Further examples of distortions induced by deliberate policy choices include the use of economic incentives for land conversion and clearance which often lead to the loss of forests and wetlands. Subsidized credit and tax allowances for cattle ranching leading to deforestation, or acquaculture farm subsidization leading to the destruction of wetlands, are illustrative examples.[26] Also damaging to the environment, and ultimately compromising the pursuit of sustainable development, is the failure to intervene in situations

where external costs are generated by the existence of open access to important resources. It is also worth noting that the high cost and short-term nature of informal credit often biases rural investments against long-horizon natural resource activities such as tree planting or conservation, and thereby contributes negatively to sustainable development.

24. Distortions affecting sustainable development do not arise solely from policies directed to the natural resource sectors. Policies which promote industrialization at the expense of agriculture may also promote inequality, underemployment and scarcity of rural credit. This, in turn, may discourage investments in land conservation and encourage encroachment on marginal lands, which together with the consequent social tensions, weaken the basis for sustainable development. Certain trade policies can also create problems. In developed countries, agricultural protectionism leads to much more intensive farming than is environmentally or economically justified. In addition, protectionism impedes the access of low-cost producers, with comparative advantage in certain manufactures, to developed country markets, thus raising consumer prices in developed countries while lowering incomes in developing countries. This can exacerbate environmental pressures in developing countries if the result is to force them to intensify exports of environmentally costly products or to constrain their investment in more environmentally-sound methods of production.[27] Moreover, the distorting effects of macroeconomic mismanagement, through monetary, fiscal and foreign exchange policy interventions, can be as detrimental to natural resource management and the environment as to other sectors of the economy. Increasing foreign debt, growing budget and trade deficits, or hyperinflation, in a framework of poverty and economic stagnation, can encourage environmental degradation and unsustainable development.

Box 3.

Policy failures in the Canadian cod fisheries

For many years, a defining characteristic of the Canadian economy has been its cod fisheries. Decades of Canadian university students have learned Canadian economic history primarily through books on The Fur Trade and The Cod Fisheries. Yet on 2 July, 1992, the Canadian federal government announced that it had imposed a two-year moratorium on cod-fishing in the Atlantic. What had happened to bring a once-proud $700 million per year industry to its knees in this startling fashion? The case study below documents the story of an environmental collapse due entirely to a failure to internalize external costs.

In 1977, Canada gained control of the 320 km. (200 mi.) economic zone off Newfoundland following the United Nations Law of the Seas Conference (UNCLOS) which allowed nations to extend their control of resources beyond the then traditional three mile limit. The Canadian federal government then took a fateful policy decision to foster the introduction of modernized "dragger net" trawlers, using high-tech fish-finding electronics and ice-breaking capacity. The dragger nets were virtual vacuums scooping everything from the sea bottom; the electronic gear allowed the boats to pinpoint theretofore unknown fisheries; and the ice-breaking capacity allowed them to enter winter resting areas which the fish stocks used to replenish themselves. The government also invested hundreds of millions of dollars in the establishment of two giant trawler companies, gave them half of the total available quota of fish available on the Atlantic coast, and established an "Enterprise Allocation" system which inadvertently encouraged trawlers to cull ruthlessly their bountiful catches by dumping overboard dead and dying fish so as to remain within the set limit.

The dragger nets replaced much of the fixed gear long-line fishing, traps and anchored net fishing that had sustained the fishery for hundreds of years up to that time. In consequence, between 1978 and 1988 the reported commercial catch (not counting the nearly equal amount dumped overboard) climbed from 135,000 to 266,000 tons. Environmental groups and the inshore fishermen who had long

Box 3 (cont'd.)

been practising sustainable fishing warned of the damage that would result from abuse of the dragger nets and high technology, but the federal government continued to set high alowable catches; it set 1992's allowable catch at 185,000 tons, despite the fact that in 1991 the cod fishery was already so decimated that the actual catch was only 127,000 tons. In a bizarre response, the government initially blamed seals - which had lived for centuries in harmony with the fish - for the fisheries' devastation and called for controls on seal populations. It also noted, correctly, that the very large foreign factory fleets from France, Spain and Portugal, replete with sonar and refrigerator and canning ships, had virtually pitched a permanent "camp" above the rich Atlantic cod fisheries outside Canada's 320-km economic zone, joining Canada's large ship fleet in "vacuuming" the sea clean of all sizes and all kinds of fish, both the mature and immature. Finally, in July 1992, recognising the collapse in the catch of legal size cod and that what cod were left were the young needed to bear the next generation of cod, the government imposed the moratorium cited at the outset.

In addition to the damage already caused to the ocean ecosystem, the economic impact of the policy failures cited here could be quite substantial: over 19,000 fishermen, plant workers and trawlermen in some 300 communities along Canada's east coast could become jobless during the two year moratorium. And instead of a well-managed sustainable fisheries supporting stable incomes and tax revenues to the federal, provincial and local governments, those governments face the prospect of spending over $1 billion to support the lives of the out-of-work fishermen and their families. Nor is cod the only fishery that has been decimated by failure to internalize environmental costs adequately: Atlantic salmon catches have been steadily declining for years. In 1967, commercial landings of salmon were more than four times higher than 1991's catch. Over-fishing, combined with industrial pollution and destruction of habitat have led to the demise of this economic base. Again, the federal government, unable to introduce an environmentally-sound policy soon enough, closed the commercial fishery altogether in all of Newfoundland, except Labrador, for five years in March 1992. Compensation of $40 million is to be paid out to the fishermen made unemployed by this decision.

Source: Drawn from Gallon, G.T., "Reconceptualising Economic Development: Brown Economics vs. Green Economics", The Human Economy Newsletter, Vol 14, No. 3 (Sept. 1993), pp. 1-12 with the kind permission of the author.

25. Policy failures are not the exclusive domain of governments. Although international development agencies, such as the World Bank or the International Monetary Fund (IMF) have made significant strides recently in taking environmental issues into account in the formulation of structural adjustment programmes (SAPs), there remains much to be done if these programmes are adequately to promote sustainable development. Questions regarding the social policy aspects of these programmes are not treated in the present paper; the focus here is rather on resource pricing issues. SAPs have made some progress in moving the prices of certain resources (particularly energy and food) towards levels which internalize full social costs; but complete internalization for all products, whether via regulation or economic instruments, is not yet a feature

of SAPs. Since these programmes are likely to define macroeconomic and sectoral policies for the remainder of the decade (and perhaps beyond) in a large number of developing countries, this failure to push strongly for sustainable development-enhancing internalization must be considered a serious defect.

26. Resources will not be priced adequately if property rights to the resources in question are absent, ill-defined, or insecure,[28] with the result that environmental losses and unsustainable development paths may ensue. In the particular case of open access or public goods, a failure by governments to establish property rights adequately prevents the capturing of the value of the environmental services of natural resources, thus providing little incentive for individuals to use sustainably or to preserve these services.[29] Equally, distortion will arise if in the case of a global open access externality such as biodiversity and species information, governments, particularly in biodiversity-rich developing countries, neglect to intervene when, for example, pharmaceutical companies receive monopoly profits from materials originating in these countries without being subject to control regarding the sustainable use of biological diversity, or without engaging in any internalization exercise.[30]

B. Instruments for internalization

27. As noted in the Introduction, the regulatory approach to improving environmental quality has gained widespread use, particularly in developed countries. It must be noted, however, that in some cases, regulations have proved to be legally or practically unenforceable, technically difficult to monitor and of insufficient economic weight (in terms of penalties for non-compliance) to constitute a deterrent adequate to effect fundamental changes in behaviour.[31] Recent evidence indicates that the costs of obtaining additional improvements through regulations can be significant in terms of failure to allocate pollution abatement efficiently across individual polluters, failure to provide sufficient incentives to reduce environmental costs, and failure to refrain from excessive intervention in the functioning of markets.[32]

28. Beyond the regulatory approach lies an entire array of policy approaches which take advantage of market principles in achieving objectives. The cost effectiveness of such "economic" instruments as well as the attractiveness, for governments with large public deficits, of savings or even the generation of funds through such instruments, combined with their dynamic efficiency, flexibility and relatively easy enforceability has led to increasing interest in the adoption of such instruments.[33] It must be said, however, that the widespread use of economic incentives as instruments for internalization is still infrequent in most countries.

29. For an economic instrument to function effectively as a stimulus to sustainable development, it must affect behavior, by creating an incentive sufficiently powerful as to make polluters and consumers change their decisions about which processes to use and which products to buy.[34] The particular methods by which this may be accomplished are discussed in the following paragraphs, together with brief references to the recent experience in the use of these instruments in both developed and developing countries.

1. Charges

30. Governments in some countries have already achieved some success in using charges which can be imposed either on the emission of pollutants degrading the environment (on air, water, soil, etc.), in which case they are called emission charges (fees); or on products that are harmful to the environment when used in production, consumed or when they become waste matter, known as product charges (fees or taxes). Other charges also used include user fees for the cost of collective or public treatment of effluents, and administrative charges including control and authorization fees to pay for the services of the regulatory

authority.

31. Emission charges create powerful incentives to reduce natural resource and environmental degradation as quickly as possible, since reductions of pollution bring with them the reduction of the tax or charge that the polluter must pay. They also create continuing incentives for the development and adoption of newer and better approaches to pollution control, and thus are likely to impact very positively on sustainable development programmes, particularly since the revenues collected can be used for poverty alleviation, equity enhancing, or other distortion-reducing purposes. Emission charges are fairly widely used in developed countries;[35] experience with emission charges in developing countries is limited.[36]

32. Product charges are levied on inputs to production processes and on the outputs of these processes. In practice, such charges have more frequently been applied to intermediate or final products than to inputs or wastes. Examples of product charges which are effective in altering the behaviour of consumers and producers include carbon taxes, energy pollution taxes, agricultural input taxes, as well as product charges (on pesticides, fertilizers, plastic bags or batteries, among others).[37] Gasoline taxes to control pollution may be applicable in cities of both developed and developing countries in order to internalize pollution-induced health costs, as well as reduce traffic congestion.[38]

33. Emission and product charges go some way towards "full cost" pricing, with the cost of a good being adjusted so that it reflects, to some degree, the reduction in social welfare caused by any environmental externality associated with it.[39] Such charges are thus internalization instruments designed to move an economy towards the production of less of the environmental externality in question.[40] For developing countries' governments, in particular, the fact that environmental taxes are, to a certain extent, self-policing and can constitute a source of government revenue, are advantages to be taken into account in deciding whether to use them.

2. Subsidies

34. Subsidies in natural resource based sectors, publicly administered resource prices and interventions that cause domestic agricultural prices to differ from world price levels are illustrations of subsidies generating environmental external environmental costs in both developed and developing countries.[41] Input subsidies such as pesticide or fertilizer subsidies as well as low water charges, subsidies in coal, oil, gas and electricity, and deliberate policies that may encourage the rapid depletion of natural resources and the environment (deforestation, biodiversity degradation, etc.) are commonplace. Governments have a crucial role to play in addressing resource and input under-pricing policies through appropriately correcting policy failures at the source of the externality, in particular in the areas of water, energy, pesticides and fertilizers.

35. Reducing or eliminating such subsidies yields both economic benefits and environmental gains in the form of health and ecological improvements (e.g., by correcting the misuse or excessive use of pesticides), increasing the rate of return to conservation measures (e.g., by negating policies which depress the price of land), or reducing air, water and solid waste pollution associated with the provision and consumption of energy (e.g., through the elimination of subsidies to energy).[42] In addition, as noted above, such subsidies constitute a serious drain on government revenues, while the resources so wasted could have been used for other purposes that could benefit poor populations equally well or better.

3. Marketable permits

36. A particularly interesting method of internalization is the creation of

markets where none exist. Marketable permits create markets to allow polluters to trade in a limited supply of pollution rights. Such internalization through emission trading has the following characteristics:[1]

Box 4

Internalisation of external costs in Polish industry

Poland's environmental problems have received extensive attention in the international media since the early 1980s. Recent studies have estimated that environmental externalities amount to as much as 9% of GDP, to which must be added the transboundary effects of "imported" pollution deposited on Polish territory by polluters in other countries, which are estimated to increase the total damage by a further third. What is less well-known is the extent to which the Polish authorities have attempted to internalise the external costs of polluting activities by means of economic instruments.

A substantial part of the pollution problem in Poland is the historical legacy of the inefficient allocation of resources typical of non-market centrally-planned economies, which were characterised by excessive use of virtually all resources, including environmental resources. As a result of political and economic reforms initiated in 1989, this source of inefficiency is gradually being eliminated, by removing price distortions and perverse incentives which acted as subsidies for environmentally-unsound activities.The other source of Poland's environmental problems, the externalities observed in most economies with an extensive industrial sector, is being tackled by enforcing emission standards, by issuing permits to pollute, and by establishing emission charges; subsidies are also offered for environmental investment activities, financed by environmental funds.

The most distinctive feature of environmental management in Poland is its extensive system of pollution and resource fees collected by government and (partially) redistributed to firms and municipalities for abatement and conservation purposes.Environmental fees have existed in Poland since the 1970s, but in an economy where all essential inputs were allocated administratively, such instruments were doomed to failure because plant managers had little incentive to respond to price stimuli. Since the 1989 reforms, the incentive effect of the fees has been able to function, and has been sharpened by fee levels which rank among the highest in the world: in 1992, they accounted for 0.5% of GDP and provided as much as 58% of environmental investment financing.

There is still, however, a gap between the environmental damages attributable to polluting enterprises and what they spend on environment. In a sample of 112 major industrial polluters (accounting for 20-25% of Polish air and water pollution in 1992) it was found that the sum of expenditures for pollution fees, abatement activities and non-subsidised environmentally-linked investment was only 73% of the value of damages.This suggests that the most compelling internalisation strategy would be to raise such charges still further. On the other hand, the weight of the pollution fees in production costs in the sample enterprises was relatively high at 5% on average, 12% for some chemical plants and fully 67% in one coal mine. Since substantially higher charges would affect the short-term

Box 4 (cont'd)

competitiveness of the firms in question, there is reluctance to pursue such further internalisation on account of the potential employment effects. Indeed, by mid-1993, of the 112 enterprises surveyed, 5 had gone bankrupt, 27 were partially shut-down and 12 were still functioning despite severe non-compliance with environmental standards because of local unemployment problems.

Source: Broniewicz, E., B. Poskrobko and T. Zylicz, "Internalising environmental impacts of industry in Poland: A case study", Bialystok Technical University and Warsaw Ecological Economics Centre, January, 1994.

(a) Specification of a predetermined level of emissions or emission concentration within a specified area;

(b) Permits equal to the permissible total level of emissions, distributed among polluting firms and plants in the area;

(c) Permits tradeable among plants of a single firm, as well as among firms.

(d) Permission for firms that maintain their emission levels below their allotted level to sell or lease their surplus allotments to other firms or use them to offset emissions in other parts of their own facilities.

37. Tradeable instruments for internalization are easier to monitor and bear lower transaction costs and greater dynamic incentives than emission charges. Like charges, they give clear incentives for firms to seek less environmentally damaging techniques of production, particularly if the permits are steadily reduced in number (they can be given a finite life, or they may be purchased on the market by government agencies). Initial allocation of the pollution permits can be done on the basis of current pollution emission or of other considerations related to sustainable development including, for example, population as a way of vesting property rights with particular groups. Alternatively, firms could be invited to bid for the permits, and the permits sold at the market clearing price.

38. There is some experience to date in the operation of pollution permit markets. In the United States, a system of marketable pollution permits used for ambient air quality control has been in use for nearly a decade now, as part of an effort to implement the US Clean Air Act.[44] Other more recent cases have been reported,[45] including Singapore's system of auctionable permits for the consumption of ozone depleting subtances. Such permits would seem to be a very attractive way to internalize external costs without compromising sustainable development.[46]

4. Deposit refunds

39. When the externality consists of goods which may have negative environmental effects if abused in their use or disposal, deposit-refund systems - which work through a surcharge, placed on the sale of potentially polluting products, which is refunded when certain conditions are satisfied - provide one

instrument of internalization.[47] Particularly because of their low administrative costs, deposit-refund systems for beverage containers are widespread in both developed and developing countries. The implementation of such schemes for other articles such as batteries or car hulks has started to take place or is in the process of being very seriously considered.[48]

5. Property rights

40. As noted above, where property rights do not exist or are ill defined, no incentives are provided to individuals to use open access goods sustainably or to preserve the environmental services they provide. The allocation and enforcement of property rights as an instrument for internalization can be accomplished through the use of land titles, water rights, user rights (licensing fees, concession bidding), development rights or reassignment rights. In addition, some customary regimes for the management of common property resources may have an equivalent effect. It should be noted that property rights can be assigned for resources only if the condition of "excludability" can be met, i.e., the resource must be such that it is possible to prevent its being used. This in turn is largely a matter of institutional arrangements. Air is often cited as the archetypal "non-excludable" good, but measures like the Vienna Convention and Montreal Protocol concerning the protection of the ozone layer show that exclusions can be arranged; it is even possible to collect rent on the air, for example by the use of tradeable carbon emission entitlements.[49] It must also be possible to enforce property rights, once assigned; this depends on both administrative capacity and the cost of enforcement. Other conditions which need to be met if property rights are to become a valid instrument of internalization include the requirements that they be exclusive, transferable, secure[50] and conferred for a sufficiently long time period.[51] It should also be borne in mind that even if transferable property rights can be assigned, the question remains whether it is desirable to do so if sustainable development is to be served: to formalize property rights can make them an easier target for more powerful interests. How important an issue this is will depend on the particular social and institutional context.

41. If property rights and responsibilities are to be used as a way of internalizing external costs in the interests of sustainable development, it is evident that those to whom the rights are assigned should be able both to take decisions concerning the use of the resource in question and to implement those decisions.[52] Moreover, they will need to understand how the resource relates to its environment,[53] so that decisions are likely to be followed by the appropriate effect; for this reason, attention needs to be paid to the ownership rights of women. Similarly, as regards the ownership of royalty rights with respect to genetic resources, administrative practicality argues in favour of assigning the rights to national governments, but the understanding essential to effective management of the resources is likely to be situated at a more local level.[54]

6. Bonding systems

42. The "performance bond" is a quantity of money paid to the government, or its agent, prior to undertaking an action which may be environmentally damaging. If no more than a pre-specified level of damage depletion occurs, the bond is repaid; if the limit is exceeded, the bond is forfeit. Performance bonds are usually applied when the potential environmental damage is clear and its source readily identifiable, as in the case of surface mining.[55] However, they can be applied to the internalization of a great variety of external environmental costs, including the use of open access forests, or the depletion of privately owned resources (an intertemporal issue).

7. Information systems

43. Information is a major input to sustainable development.[56] The first step to the internalization or avoidance of an externality is to be aware of the existence and nature, and better still of the magnitude of the externality. This

requirement underlies Principle 10 of the Rio Declaration: ignorance serves the externaliser.[57] The generation and skilful dissemination of information on the environmental costs of certain activities, and on the interaction between economic and environmental choices, can alter the public perception of environmental risks and problems, thus leading to more sustainable approaches.[58] In many developing countries, the very limited availability and poor quality of information, very often due to the limited reliability of natural resource endowments data or to communication difficulties and weak institutional structures, accentuate the difficulties: education, information and awareness provide the essential incentive to make the other types of measure discussed in this section effective. Conversely, the application of other measures educates and increases awareness. This is the ultimate internalization: environmental consciousness fully internalized into the kind of normal behaviour which is not questioned. Moreover, a requirement that information be made public can be viewed as a market instrument because it enables consumers to choose, and it can be effective in altering corporate behaviour.[59] Another informational device, "Prior Informed Consent", which appears in a number of international instruments, can raise awareness of hazards in countries when their consent is sought.[60]

44. Finally, it is an important aspect of information to establish that the environment impacts on economic welfare. Adequate consideration of integrated environmental economic accounting and natural resource accounts can serve this last purpose by illustrating the strong link prevailing between the environment and national economies, and be an effective incentive for internalization and sustainable development. Efforts towards environmental-economic accounting have been the subject of many studies and research in these recent years. Although most of the economic litterature with respect to environmental economic accounting relates to developed countries' experience, recent studies are looking more specifically at developing countries.[61]

8. Liability and litigation

45. The Rio Declaration, in Principle 13, includes liability and compensation among the instruments for internalizing external costs.[62] Liability and compensation are economic instruments: if the entity causing specified external costs is apprehended, it is required to make a payment. The external cost is a contingent liability and in appropriate circumstances can be converted into a known cost by means of insurance. If external costs are to be internalized through insurance, those who cause the risk must be able to insure, which requires being sufficiently liquid to afford the premiums; also, the administrative costs facing the insurance companies must not be so high as to discourage them from undertaking the business. It is consequently rare, especially in developing countries, for artisanal enterprises using hazardous products to insure against the liability which could be attached to them.

46. It should be noted, however, that insurance functions when a large number of events of moderate cost are possible with low probability each: beyond a certain magnitude of risk, the insurance industry is unwilling to provide cover (e.g., for major nuclear accidents). In many countries, normal practice in this latter case is for government to accept ultimate liability. Since governments do not insure for such eventualities, the end result is that the contingent liability is carried by the public, including in particular the eventual victims. As a result, large risks are externalized, and activities which give rise to them are subsidized to that extent. Internalization in such cases would seem to be best handled through the precautionary approach, as set out in Rio Principle 15.[63] Apart from the precautionary approach and insurance, another way of dealing with external costs which may be open to those who might be held liable is dissimulation. The method is widely used because it is particularly (but not exclusively) suited to small polluters. In the absence of enforcement, it is often the method with the lowest private costs.

47. Enforcement of liability often involves litigation, which is economic in

nature if the sanction imposed on the party at fault takes the form of a compensation payment or a fine. Litigation involves apportioning blame and thus requires the establishment of the causes of the external costs at issue; this contributes to prevention in the future and enhancing public awareness and information. On the other hand, litigation tends to be costly and is therefore better suited to high-income societies. It is also unlikely to internalize external costs if the victims are individually poor relative to the polluters, if they are poorly organized or if they lack the education required to exploit the court system effectively. Furthermore, recourse to litigation seems to be culture-specific.

9. Voluntary schemes

48. There is a growing number of voluntary schemes for internalization adopted by enterprises individually, nationally or internationally. Among the international ones can be mentioned the Responsible Care programme of the chemical industry through the International Council of Chemical Associations[64] or the World Federation of Engineering Organizations' Code of Environmental Ethics.[65] At UNEP's instigation, 38 banks[66] have signed a Statement by Banks on the Environment and Sustainable Development. The International Chamber of Commerce's Business Charter for Sustainable Development was adopted in 1990; by October 1993, 1159 companies and business organizations had adhered to it, about one third of them in developing countries.

49. Voluntary codes are particularly effective when they stimulate the search for ways of reducing internal costs without increasing external ones. This may involve improved technologies or changes in taste, i.e. a shift in the demand curve for intermediate goods, as for example in the shift to the use of recycled paper for corporate communications. Where they entail an increase in corporate costs, they are more effective when competing firms are subject to the same constraints, as, for example, in an industry which is dominated by a few large firms. Whatever the structure, however, free riders can threaten a voluntary agreement; it is important therefore that measures affect all firms in the industry.

10. Other policy instruments

50. Increasing attention is being given to other instruments for the internalization of environmental costs, such as environmental funds and environmental management control agreements. Environmental funds are constituted from fines or charges levied on polluters; loans are then made (or grants given) to firms investing in pollution control technology. This instrument has been in use in Japan, as well as in certain developing countries (Republic of Korea and Thailand).[67] Pollution control agreements take place between industry and government or local communities and rely on moral suasion and self-policing to effect behavioural changes vis-a-vis the environment. They are widely employed in Japan and Indonesia, and although not legally binding, their strength is based on the demonstration effect achieved when publicity is given to the names of firms not honouring their agreements.

C. The choice of the right policy mix

51. The selection of the correct mix of policy instruments for internalization implies a careful balancing in the choice of the instruments. As an illustration of how complex this can be, a brief comparison of alternative market-based internalization techniques is in order. A large number of possible criteria could be used for these purposes; here, the following will be used:[68]

Environmental effectiveness: The environmental effectiveness of economic instruments is determined largely by how polluters react to the continuing incentives such instruments provide for pollution abatement, technical innovation, and product substitution.

Economic efficiency: This requires that the economic cost of complying with environmental requirements is minimised.

Equity: Distributive consequences vary according to the types of policy instruments applied.

Flexibility: The ease and speed of adjustment of the instrument to changing conditions can be an important factor when administrative or parliamentary procedures are required to effect alterations to the basic parameters of internalization instruments.

Acceptability: For an instrument of internalization to be acceptable, those affected must be informed and consulted. In addition, certainty and stability over time as regards their basic elements are important conditions for acceptance of such measures.

52. Thus, on the criterion of environmental effectiveness, emission charges may be preferred to marketable permits based on a fixed amount of permissible pollution which thus allow firms to pollute as much as before as long as they remain within the allowable limits. On the other hand, these limits can always be adjusted downwards to meet revised objectives; also, marketable permits would be preferred on grounds of flexibility because of their easier and more automatic adjustment to changes in markets than in the case of charge systems. Moreover, whilst in general marketable permits seem to be superior instruments to emission charges in terms of economic efficiency, price-based systems (emission charges) may be preferred in the case of developing countries, because of their potentially lower costs of implementation and monitoring.

53. However, it must be borne in mind that the marginal utility of money is not the same for everyone: the poorer one is, the higher its marginal utility. If costs are minimized by shifting them to the poor, lower costs may correspond to an even greater loss of welfare, to a heavier burden of external environmental costs; sustainable development could hardly be served in such conditions. Those who have more means at their disposal have more choice in the activities they undertake: the poor have less choice. In so far as the aim is to change behaviour, it is likely to be sensible to choose measures which impinge more on those with more resources; indeed this can be related to Rio Principle 7, which refers to common but differentiated responsibilities[69] and Principle 8, which refers to reducing and eliminating unsustainable patterns of production and consumption[70].

54. Finally, as regards the criterion of equity, it may be noted that the distributive impact of emission or product charges or taxes would depend upon how the revenue is used. Similarly, with marketable permits, the distributional effects will differ according to their initial allocation. Priority to the poor - the basis of equity considerations - also has implications for the allocation of property rights. If different allocations can be imagined which have the same implications for the other criteria discussed in this section, the one which best reduces poverty or decreases disparities in standards of living would seem to be preferable. An environmental value-added tax (E-VAT) to internalize resource value at the points at which the resources are introduced into the economic process might in a similar way distribute the revenue thus raised in a manner more favourable to the poor.

55. In the light of these observations, a broad agenda for feasible internalization leading to sustainable development, which would be equally valid in both developed and developing countries, could look as follows:[71]

(a) Attenuation or elimination of policies that distort resource allocation, in particular, environmentally-unsound subsidies;

(b) Correction of fundamental incentive failures, such as insecure or absent property rights, or unpriced resources;

(c) Gradual introduction of other internalization instruments of a regulatory or economic nature in a sequential form:
(i) internalization through revenue generating instruments such as charges (product charges may be easier to implement);
(ii) use of the revenues to increase knowledge and information availability, and to reinforce institutional capacity in the environmental area;
(iii) introduction of economic instruments for internalization (marketable permits, emission charges, etc.);

(d) Internalization of external environmental costs induced by the effects of public projects, sectoral and macroeconomic policies.

Such a programme would also need to be complemented, at the international level, with measures to ensure that intragenerational equity considerations are also respected between nations when local, transboundary and global external environmental costs are confronted. It is to these aspects to which this report now turns in chapter IV below.

IV. THE INTERNATIONAL DIMENSION : COOPERATIVE INSTRUMENTS FOR INTERNALIZATION

56. The discussion to this point has focussed on measures which can be taken by nation-states individually to internalize external costs which have an impact on sustainable development. A question which may be posed in the intergovernmental forum provided by UNCTAD is to what extent international cooperation can help to speed up the process of such internalization, or may even be required for the internalization to occur at all, and what basic forms such cooperation could take. The Board may wish to consider this question in its debate on internalization.

57. For its part, the secretariat is of the view that global optimality demands global cooperation. Developing countries face, however, a policy conundrum: throughout the developing world, there is a strongly-perceived need for the modernization of commodity production and for industrialization, whether in the form of strengthening an incipient process (as in much of Africa and parts of Asia); of reviving a process which has been interrupted (as in parts of Latin America); or of continuing an ongoing, even rapid, process (as in parts of South-East Asia). But without major changes in the technology of industrial and commodity production, such a development strategy is likely to imply further environmental degradation. Thus, the imperatives of environmental protection and of development may well pull in opposite directions. Resolution of this conundrum would seem to require of policies that they meet three main criteria:

(a) that they be capable of bringing about the internalization of external environmental costs;

(b) that they allow continued economic development in all countries, and enable the process of industrialization and modernization of commodity production to proceed unimpeded in those countries in which this process is incomplete; and

(c) that they provide appropriate incentives to ensure that the development process in developing countries, and the replacement, renewal and expansion of industrial facilities in both developed and developing countries, embody technology and practices which are environmentally sound.

Unfortunately, the incentives facing individual countries frequently work in the opposite direction because, even though it is in the interest of all nations to ccoperate and reduce their rate of use of environmental resources, every nation

can minimise economic costs by "free-riding" on the virtuous behaviour of those which cooperate.[72] Therefore, an efficient system of incentives at the international level (as part or not of environmental agreements) is needed to induce cooperative environmental protection. Moreover, in line with Principle 7 of the Rio Declaration, special attention needs to be paid to the search for, and adoption of, positive incentives directed towards the developing countries.

A. Financial transfers

58. One type of such incentive is financial in nature. It may take the form of the debt-for-nature swap, a debt conversion in which instead of acquiring the equity, the holder of discounted debt agrees to help the indebted country conserve a natural resource.[73] There is already considerable experience with this incentive, as such swaps have occurred in many developing countries. Another form of such transfers, with which there is less experience, is the "side payment" or lump sum payment transferred directly to compensate a country for certain actions, such as not developing a resource in an international environmental agreement.[74]

59. A further form of financial transfer in this context is the provision both of assistance or loans for environmentally beneficial (or at least benign) projects and of bridging finance for the changing of production methods. Such transfers are being made increasingly through bilateral aid programmes and multilateral financial institutions. The most recent institutional example is provided by the Global Environment Facility (GEF), whose establishment also reflects global agreement that the actions that a single country can take to improve the environment also benefit other nations.[75] Other international cooperative instruments linked to project finance include "external offsets" or "joint implementation", under which countries with agreed national emission targets are credited with meeting these targets either by curtailing their own emissions or by investing elsewhere to reduce emissions so that the total of national emissions minus the amount saved by those external investments would meet the target.[76] This approach is included in the Framework Convention on Climate Change and has been introduced on an experimental basis by Norway.[77]

60. Other mechanisms at the international level might be considered by governments as an alternative or a complement to an agreement on domestic emissions. One such could be the use of internationally tradeable emissions permits allocated according to internationally agreed criteria. (It is on these grounds that UNCTAD has recommended allocating tradeable carbon emission entitlements in proportion to adult population.[78] International emission taxes could also be a very effective means of raising prices to reflect external costs. In this case, raising the revenue and deciding how it is to be spent are two distinct questions. The conventional view[79] of public economics is that "earmarking" is a potential source of inefficiency in fiscal decision-making. On the other hand, earmarking of environmental taxes to a particular type of expenditure may encourage greater popular support for the measure than if the revenues were simply to be allowed to augment the general resources of government.[80] This suggests that such taxes could be paid in proportion to emissions, and redistributed to ensure a net transfer from richer to poorer countries. Revenues could flow through a central international clearing fund, an environmental equivalent to the Bank for International Settlements in the financial domain.[81]

61. An additional instrument which would appear to hold considerable promise is a broadly-based tax on added-value, to offset via the market the underpricing of resources which both causes environmental degradation and comes at the expense of the developing countries, where the underpriced resources are located or where a disproportionate share of the external environmental costs fall. Such a tax, which might be called an "environmental value-added tax (E-VAT)", could be designed in such a way as to take distributional implications directly into consideration. Less broadly based, but perhaps easier to implement would be a

small international levy on air travel, to be earmarked for sustainable development purposes. As with the emission tax, such a tax could be channeled through a central international clearing fund.

B. International commodity-related environmental agreements

62. Production of primary export commodities is an important source of environmental damage in developing countries.[82] Because of the potential effects of unilateral internalization by commodity producers upon their competitiveness, and because many countries which export commodities are poor, the need for international cooperation is particularly great in this area. As a response to this, it has recently been proposed to set up international commodity-related environmental agreements (ICREAs). An ICREA would be an intergovernmental agreement to establish, for a specific primary commodity, an international framework to allow commodity-exporting developing countries to recoup the costs of producing the commodity in a (more) sustainable way.[83] This form of internalization would implement a de facto correction of the under-pricing (in terms of the environmental and natural resources costs involved)[84] of internationally traded commodities, together with a compensation to developing country exporters for the costs of transition to environmentally preferable production technologies and for diversification costs.

63. The ICREA proposal has among its main advantages that:

(a) it would induce minimal retail price changes because the cost of producing a commodity is only a small fraction of that retail price;

(b) compensation would be a contractual obligation;[85]

(c) the revenue raising device would establish a link between the volume of commodity imports and the amount which the importing country should transfer to the international fund from which the ICREA would pay compensation to exporting countries. This could be realised via import levies, but if the price elasticity of import demand were high, other financing devices could be used as well.

It has been argued against this proposal that the external environmental costs arise from the techniques used to produce the commodity, not from the commodity itself.[86] A counter-argument could be, however, that compensation can be used to deal directly with the correction of these production techniques.

C. International trade instruments

64. Certain trade policies can conflict with the objectives of sustainable development. In developed countries, agricultural protectionism leads to much more intensive farming than is environmentally or economically justified. In addition, protectionism impedes the access of low-cost producers, with comparative advantage in certain manufactures, to developed country markets, thus raising consumer prices in developed countries while lowering incomes in developing countries. This can exacerbate environmental pressures in developing countries if the result is to force them to intensify exports of environmentally costly products or to constrain their investment in more environmentally sound methods of production.[87] Where they thus stimulate a natural resource-based export specialization of many developing countries in the presence of poverty and poverty-related environmental problems, such policy-induced distortions exacerbate the problem of intra-generational inequity between countries.

65. Trade liberalization and environmental protection are however in general fully consistent with each other. Nevertheless, if the internalization is not implemented in pace with trade liberalization, such liberalization may merely

transmit external environmental costs to other economic agents. Although this is not an argument against trade liberalization, it nonetheless implies that the contribution of trade liberalization to sustainable development will be achieved only when the liberalization is accompanied by government policies to ensure the adjustment of economic incentives to environmental objectives.

66. Policies to internalize external environmental costs may affect market access and international competitiveness; this subject will be treated in depth at the first part of the forty-first session of the Board. Since the internalization of environmental costs may increase the private costs of production,[88] it has been argued by some observers that concern about potential competitive disadvantage and ensuing trade losses may inhibit countries from moving towards fuller internalization.[89] This has resulted in calls for the harmonization of production standards and the application of countervailing duties or other measures to "level the competitive playing field" or to offset hidden subsidies and "ecodumping".[90] It may be noted, however, that empirical and analytical work indicate that environmental countervailing duties are very difficult to justify from either a trade or an environmental point of view.[91] Whatever the merits of these differing views, however, it is clear that a cooperative international approach will be required to resolve potential problems.

D. International institutional incentives for environmentally sound technologies

67. Technologies already available can provide solutions to a wide range of the recognized problems of the environment and potential future technologies hold out the prospect of even more substantial improvements in production techniques, geared towards the practical implementation of environmentally sound, sustainable development in those sectors and countries which apply these techniques.[92] These innovations will, however, promote sustainable development on a global level only if the international community works out new cooperative arrangements to create incentives in all countries for changing techniques. Agreements reached at Rio reflect international recognition of the need to facilitate and finance the transfer of environmentally sound technologies "on favourable terms", as manifested in both the Framework Convention on Climate Change and the Convention on Biological Diversity.[93] These represent early steps towards the arrangements suggested above; much more will need to be done if environmentally-sound technologies are to be sufficiently widely diffused as to ensure that production techniques everywhere on the globe are coherent with the precepts of sustainable development.

68. In the context of UNCTAD, the Ad Hoc Working Group on the Interrelationship between Investment and Technology has highlighted in its work programme the need to consider policies and measures for the promotion, development, dissemination and financing of environmentally sound technologies (ESTs), particularly in developing countries. At its second session the Working Group noted with satisfaction the report of the Workshop on the Transfer and Development of ESTs (Oslo, 13-15 October, 1993) organized by the UNCTAD secretariat and the Government of Norway. The Workshop considered a diverse array of mechanisms, some already established and in need of improvement, others of a more innovative nature. It also identified a number of priority elements for an action programme in this field, including among others, the lack of information, awareness and training; benchmarking as an effective instrument by which to assess, monitor and encourage best practice standards at the firm level; development of effective regulatory structures and enforcement mechanisms; and a need to provide for a financial instrument, comparable to the global conventions, for addressing local problems with environmental, technological and developmental dimensions. In all the above fields, the Workshop further identified areas for additional study and research.

69. Further discussion of this issue will have taken place at the third session

of the Ad Hoc Working Group on Investment and the Transfer of Technology, which will meet just prior to the current session of the Board. At the time of writing (late 1993), however, it seems relevant to note a few points. Thus, to internalize the fixed costs of changing to cleaner technologies, "environmental benefit fees" (EBFs) could be levied to fund the so-called "incremental cost of technology switching", as has been recognized both by the Montreal Protocol (on CFCs) and by the Global Enviroment Facility (GEF), and as may be considered under the framework of the recently ratified Convention on Biological Diversity. In the case of the large-scale modern sector, the need will be for EBFs to provide finance in the form of low interest loans with most of the development and installation of new techniques being done in-house. By contrast, the small-scale artisanal sector of agricultural small holders, fishermen and miners tend to face severe credit constraints and hence require financial assistance and training.

70. As regards running costs, it is necessary to determine if the costs of operating the new technology are higher than under the old technology.[94] If indeed the new technology involves higher running costs, internalization can be accomplished through the use of an "environmental premium" charged to retailers who may or may not pass them on to consumers.[95] The operation of this instrument would require monitoring or certification (via "eco-labelling") to ensure that a particular commodity or product is produced with a clean technology. In this connection, it is worth noting that recent cases have been reported of commodity producers planning to shift or having already shifted to sustainable production without any increase in the retail price.[96] Thus, whether fixed or running costs are considered, in both cases there is clear scope for international cooperation in promoting sustainable development through the internalization of the external costs associated with the failure to use clean production technology.

V. CONCLUSIONS

71. The achievement of sustainable development requires policies to promote intra- and inter-generational equity and a much increased recognition of the value of the environment. Much of the mismanagement of the environment is due to distortions induced by governmental policies which entail intervention on existing markets with environmentally unsound consequences, or otherwise fail to set in place the conditions for producers and consumers to take proper account of the full costs of resource use in their decision-making processes. The internalization of external environmental costs is a valid policy choice for addressing these failures and thus creating the conditions for sustainable development.

72. In the choice of the right policy mix of internalization instruments, account should be taken of their: (i) environmental effectiveness; (ii) efficiency in achieving objectives; (iii) impact on equity; (iv) political acceptability; and (v) flexibility in adapting to changes. As regards their implementation, a pragmatic and flexible approach should be adopted, particularly to avoid drastic changes and political disruptions. Moreover, assistance needs to be given to developing countries in order to provide them with the necessary new capital equipment and skills needed for the adoption of less environmentally damaging techniques than those currently in use.

73. Although several factors favour the adoption of economic over regulatory instruments, especially because of their superiority in terms of cost-effectiveness, experience with their use is still limited, particularly in developing countries, and regulations are in many cases needed to complement economic instruments. Full private cost recovery, including the removal of distortive subsidies inducive of external environmental costs, appears in this context to be a promising approach to ensuring sustainable development.

74. The feasibility of the internalization approach remains very dependent on

the strategy selected for its implementation. One such strategy, which has been favoured in the present report, would have countries start by attenuating or eliminating policies distorting resource allocation; implementing revenue-generating internalization mechanisms (using revenues to increase knowledge and reinforce institutional capacity); and subsequently introducing other economic instruments. This approach also requires the careful use of sectoral and macroeconomic policies to ensure, in particular, that distorting subsidies be removed, especially from the agricultural sector.

75. At the international level, where there is less experience with internalization than domestically, there is a need for the international community to adopt creative approaches to spurring the implementation in all countries of measures which will reduce or avoid external costs which impinge on the environment and thus on sustainable development. Thus, international agreements on reducing emissions (tradeable carbon emission entitlements) and international commodity-related environmental agreements, or international commodity agreements with environmental provisions, can provide all participants with positive incentives for the internalization of environmental costs - and, properly designed, can dissuade countries from refusing to participate. In addition, and precisely because external environmental costs frequently arise from the techniques of production rather than from the product, cooperative approaches to providing incentives for switching to more environmentally sound technologies also deserve careful consideration. Eco-labelling and other kinds of certification of environmental sustainability or environmental premiums constitute valid internalization instruments encouraging the spread of sustainable production methods.

76. Finally, open markets remain a key to the international transmission of internalized environmental costs; this implies that the internalization should proceed apace with trade liberalization and that there be a greater integration of trade with environmental policies. In addition, international cooperation will be needed to minimize the negative effects of regulations or economic instruments on trading partners, and particularly the developing countries.

77. In the light of these conclusions, the Board might wish to request the Standing Committee on Commodities to examine in depth the imperfect internalization in commodity producing and consuming countries of external environmental costs. This could focus on the issue of resource pricing and its implementation, including ways of ensuring global cooperation on instruments for internalization supportive of sustainable development, for example through the ICREA or other proposals. The Board might also wish to consider in detail at the second part of its forty-first session the issue of environmental finance, including several ideas broached above, such as the E-VAT, the environmental clearing-house and tradeable emission permits.

NOTES

1. The Board had previously considered issues relating to sustainable development on several occasions, on the basis of documentation prepared by the UNCTAD secretariat. The decision to hold regular discussions is, however, a new feature.

2. It should also be mentioned that one of the elements of the work programme of theCommodities Division of UNCTAD is to consider the internalization of environmental costs and resource values, including biodiversity. This activity is being developed in order to respond to the request made in item 5 of paragraph E of the work programme of the Standing Committee on Commodities for the "Examination of the manner in which prices of natural commodities and their synthetic competitors could reflect environmental costs".

3. Rio Principle 16 reads as follows: "National authorities should endeavour to promote the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment." The Rio Declaration on Environment and Development is given in A/CONF.151/26 (Vol. I), Chapter I, Annex I.

4. In summary, two conditions are essential for an external cost or benefit to exist: (a) the activity by one agent must cause a loss/gain of welfare; and (b) the loss/gain of welfare must be uncompensated. For more details see Meade. J.E. *The Theory of Economic External environmental costs*. Geneva: Institut universitaire de hautes etudes internationales and Leiden: A.W. Sijthoff, 1974 and Pearce, D.W. and R.K. Turner. *Economics of natural resources and the environment*. Baltimore, Maryland: John Hopkins University Press, 1991, chapter 4.

5. WCED. *Our Common Future*. Oxford: Oxford University Press, 1987, p. 43.

6. Rio Principle 3 reads as follows: "The right to development must be fulfilled so as to equitably meet developmental and environmental needs of present and future generations."

7. Rio Principle 5 reads as follows: "All States and all people shall cooperate in the essential task of eradicating poverty as an indispensable requirement for sustainable development, in order to decrease the disparities in standards of living and better meet the needs of the majority of the people of the world."

8. See Dommen, E. (ed.) Fair Principles for Sustainable Development. Aldershot: Edward Elgar for the United Nations, 1993.

9. See Goodland, R. and H. Daly, "Why Northern income growth is not the solution to Southern poverty", *Ecological Economics*, Vol. 8, No. 2 (Oct. 1993), pp. 85-101 for a rich discussion of these ideas.

10. This calculation is based on an assumed growth rate for the industrialized countries of 2 % p.a. and for the former socialist countries of Eastern Europe of 3 % p.a. over the 50 year period. The developing country share in world GDP is currently in the order of 30 %; it would rise to almost 70 % in this scenario.

11. Non-excludability occurs when no individuals can be excluded from the enjoyment of a good. The essence of a public or open access good is that the consumption of the resource by one individual does not prevent others also consuming it (''non-rivalry"). Air pollution is non-rival as its impact on any individual in a polluted area is not altered by the entry of another person into that area.

12. For example, in agriculture, environmental costs passed on might take the form of increased downstream flooding or sedimentation, or the damage that an upstream rice farmer's use of pesticides causes to a downstream fish farmer who uses the same water source. Globally, the emission of CFCs causing ozone depletion, or the use of fossil fuels threatening global climate change through the greenhouse effect, are additional illustrations of what can be called public open access "bads" whose internalization transforms them into "goods".

13. See Harvard Institute for International Development Research Review, Vol. VII, No. 1 (Fall, 1993), p. 1.

14. An example occurs in the choice between carbon taxes and energy taxes: a carbon tax may induce a reduction in carbon emissions, thus internalizing certain costs, but it may at the same time encourage recourse to nuclear or hydroelectric energy, thereby aggravating other external costs.

15. The "command" specifies that polluters must not exceed a predetermined level of environmental quality, while the "control" monitors and enforces the standard. The main characteristic is that the polluter has no choice but to conform to regulations or suffer the imposition of sanctions through judicial and administrative procedures. Such regulations are frequently enforced by threats or fines and other penalties, including in some cases imprisonment. See OECD *Economic instruments for the protection of the environment*. Paris, 1989. As an illustration, in 1957 the government of Costa Rica banned the import, sale or use of mercury-based fungicides for the control of coffee plant diseases. In 1975 further controls were introduced on the use of fungicides that contained arsenic or lead. In 1990 a complete ban on the use of arsenic pesticides was introduced. See Segura, O. "Environmental impact of coffee production and processing in El Salvador and Costa Rica", prepared for UNCTAD, (1993). Poore reports as well that Indonesia has implemented a policy of limiting the quantity of timber to be harvested per hectare, through a permits system. To prevent abuses of logging permits in Indonesia, in 1989, 48 concessions were revoked and 37 others suspended. Also, fines totalling US$ 4 million were issued, for cutting outside designated blocks, harvesting more than was allowable, or felling unapproved species. See Poore, D., "No timber without trees: sustainability in the tropical forest", Earthscan, London, 1989.

16. OECD. *Recommendation of the Council on guiding principles concerning international economic aspects of environmental policies, Annex 1: Note on the implementation of the polluter-pays principle*, Paris (1972), para 3. Reprinted in Dommen (op. cit.), Annex I.

17. Agricultural policies in developed countries, by inflating prices and per acre revenue, induce farmers to use more inputs and adopt chemical-intensive monocultures that lead to soil erosion, chemical run-off, loss of biological diversity, and conversion of once-natural ecosystems to cropland than would otherwise take place. See Repetto, R., "Trade and environment policies: Achieving complementarities and avoiding conflicts", World Resources Institute, Washington, July 1993.

18. It should be noted that the power of marketing boards has now decreased worldwide.

19. These support programmes encourage over-production of crops that are highly erosive, the cultivation of lands that tend to be more subject to soil erosion and moisture deficiencies, or the conversion of wetlands and forestland to agricultural production. High and stable prices for agricultural commodities also influence tillage, practices, the use of fertilizers and pesticides, the amount of excess manure, and the intensity and use of soil resources. See OECD, *Agricultural and environmental policy integration: Recent progress and new directions*. Paris, 1993.

20. See OECD, *Resource Pricing*. Environmental mimeograph, Paris, 1991.

21. Underpricing of water has encouraged excessive use of water by agricultural producers, by mining and by agro-processing plants. Under-pricing energy (including electricity) causes air pollution, excess and inefficient use, and depletes energy sources faster. Under-pricing pesticides and fertilizers encourages inappropriate and excessive use with important impacts on human health and the environment. In Mexico, farmers pay only 20% of the full production cost of irrigation water, while in Sri Lanka farmers pay only 60% of the full cost of nitrogen fertilizers. See Pearce, D.W., "The internalization of environmental costs and resource values: A conceptual study", A report to UNCTAD by CSERGE and EFTEC, 1993. A study of farmers working with pesticides in the Philippines found that 55% of them displayed abnormalities in the eyes, 41% abnormalities in the lung and 54% abnormalities in the cardiovascular system. See Coote, B., *The trade trap: Poverty and the global commodity markets*. London: Oxfam, 1992.

22. By taking too small a portion, the government allows others to capture rents. This is also applicable to the appropriation of the forest's value as reservoir of genetic information and biological diversity, a value which is largely ignored. It should be recalled that, in theory, rental rates can be set very high since, for example, forest concessionaires or pharmaceutical industries gain economic rents for practically nothing.

23. Experience with rents on minerals is most successful and shows rent captures often over 80%. However, rent capture in timber and fisheries is often much lower at less than 50% of the full user cost. While this may be due partly to technical reasons, and because of the local, transnational and global nature of this type of open access externality, it is also due to poor management and political factors.

24. The wood is mostly consumed by the construction industry in Japan, often for moulding concrete panels. Estimates suggest that over 25% of the tropical timber imported was used to make these concrete panels. See Pearce, D.W., (1993) op. cit.

25. It should be noted, however, that rental rates, although still low, are being increased for minerals timber and fisheries. For example, since 1987, the Philippines has raised forest rents whilst the island nations of South Pacific set up the Fisheries Forum Agency (FFA), in 1980, in order to increase their share of the rent from fisheries.

26. In Brazil, cattle ranching, which was encouraged by subsidized credit and tax allowances, accounted for 16% of deforestation in the State of Mato Grosso before 1970, and 20% in the State of Para. Subsidies for acquaculture farms lead to the destruction of wetlands, which act as breeding ground for capture fisheries. In Asia, where the problem is the greatest, it is estimated that, at least 1.2 million hectares of mangroves have been converted into acquaculture ponds. See Economic and Social Commission for Asia and the Pacific (ESCAP), "State of the environment in Asia and the Pacific 1990", United Nations, Bangkok, 1992.

27. In the late 1980s, about half of all developing countries' exports still comprised fuel, minerals and other primary commodities. Thus, trade distortions reduce developing countries' export revenue, and for this reason, the funds available to introduce environmentally improved methods of production. See Repetto, R., (1993), op. cit.

28. There is no reason for economizing on, paying for, investing in, or conserving a resource without an assurance of secure and exclusive rights over that resource, without having the possibility of recovering costs through use, lease, or sale, and without an assurance that such rights can and will be enforced. See Panayotou, T., "Economics of environmental degradation", in Markandya, A. and J. Richardson (eds.). *Environmental Economics: A Reader*. New York: St. Martins Press, 1992.

29. For example, it would have been a policy failure for the government of Thailand not to undertake to issue secure land titles to its farmers when it was established that the cost of titling was only a small percentage (10%) of the potential benefits. See Panayotou, T., (1992), ibid.

30. For a discussion on ways of appropriating the value of biodiversity information, see Aylward, B. A., and E. Barbier, "What is biodiversity worth to a developing country? Capturing the pharmaceutical value of species information", International Institute for Environment and Development, London Environmental Economics Centre, Discussion Paper 92-05, London, November 1992. For theoretical overviews of contracting and property rights issues, see Sadjo, R.A., "Property rights, genetic resources, and biotechnological change", *The Journal of Law and Economics* Vol. 35(1), 1992, pp. 199-213, as well as Simpson, R.D., "Transactional arrangements and the commercialization of biological diversity", ENR Discussion Paper 92-11, Resources for the Future, Washington, D.C. 1992.

31. High bureaucratic cost, large informational requirements and problems of sociocultural acceptance are generally advanced as factors impairing the functioning of a regulatory framework to protect the environment, especially in developing countries. See OECD, *Economic instruments for environmental management in developing countries*. Paris, 1993, as well as OECD, *Environmental management in developing countries*. Paris, 1991.

32. Other disadvantages of the regulatory approach to internalization are the need for administrative agencies to become experts in the pollution regulated; the need to collect and analyze considerable technical and economic information; and the fact that it constrains the choices open to polluters, or elicits only perfunctory compliance, rather than encouraging polluters to develop innovative or cost effective internalization procedures.

33. At the OECD Environment Committee meeting, in 1991, Environment Ministers recommended that OECD nations should pursue a strategy that includes the use of economic instruments to improve the integration of economic and environmental decision-making. The OECD Council subsequently adopted a recommendation on economic instruments for environmental protection and emphasized the need to use these instruments to a greater extent to improve the allocation and efficient use of natural and environmental resources, and that further agreement be sought at the international level on the use of economic instruments for solving regional or global problems and to ensure sustainable development. See OECD, *Environment policy: how to apply economic instruments*. Paris, 1991.

34. Stephan Schmidheiny with the Business Council for Sustainable Development, *Changing Course*, Cambridge and London: MIT Press, 1992, p.23.

35. Emission charges are frequently designed to encourage the control of water, waste and noise pollution. Such charges are used in France, Italy, Germany and the Netherlands. Emission charges are less common in the control of air pollution where charges have usually been set too low with not much effect on air quality. In the case of waste pollution control, there is considerable experience in municipal and industrial wastes in several developed countries such as Austria, Belgium, the Netherlands, or the United States.

36. In Malaysia, where the oil palm industry is a major polluter, a pollution charge on effluent from the processing mills has been in place since July 1988. (See Economic and Social Commission on Asia and the Pacific (ESCAP), (1992), op. cit.). Also, taxes on air and water pollution are in the process of being implemented in some developing countries, such as Thailand. In Taiwan. Prov. of China, the government passed in 1991 an air pollution control act which allows for a system of emission charges. (See O'Connor, D., "The use of economic instruments in environmental management: the experience of East Asia", in OECD, *Economic instruments for environmental management in developing countries*, op. cit.)

37. One of the most effective product charges is the surtax on oil excise duties applied in the Netherlands, since it internalizes environmental costs through the energy required to process inputs, and is administratively efficient. Other examples are the world's first carbon tax, introduced by Sweden in 1991, as well as other energy and transportation sector taxes. The tax on fertilizer introduced by Finland already in 1979, to discourage pollution caused by phosphorous and nitrogen loads is another example. See Pearce, D.W., and J. J. Warford. *World Without End*. Washington,: Oxford University Press, 1993, as well as OECD, (1993), op. cit. With regard to waste disposal, product charges on lubricant oils (following a 1975 EC directive requiring the recycling of waste oils) have been effectively implemented and have been reported to be useful as an internalization mechanism (see chapter 7 in ibid).

38. In Thailand, as from 1991, a tax on leaded gasoline has been used to finance a subsidy for unleaded gasoline.

39. The adjustment from market to full cost price is achieved by adding a tax which equates to the social welfare effects of the externality.

40. If the aim is to get an exactly correct tax, difficulties arise that have to be solved through sequential steps. First, the extra benefit society gains from an extra unit of the externality has to be calculated (marginal social benefit schedule for the externality). Secondly, the cost curve attributable to the externality should be constructed (marginal social cost). Thirdly, the level of externality at which the marginal social cost equals the marginal social benefit should be identified. Finally, identification of the level of the tax corresponding to the optimal level of the externality has also to be undertaken. For a discussion of these steps, see Pearce, D.W., and Turner, R.K., (1991), chapter 6, op. cit.

41. It must be borne in mind, of course, that these world prices themselves do not reflect all the relevant costs, and are affected by the very subsidies which are here criticised. This makes the argument against subsidies even stronger.

42. Pesticide subsidies in Indonesia, fertilizer subsidies in the Republic of Korea, subsidized energy, mainly in petroleum exporting developing countries, as well as in Thailand (lignite), Republic of Korea and Taiwan, Province of China (energy prices) or low water charge in most countries, causing overwatering and salinization problems (India, Pakistan) are just some illustrative examples. See OECD, (1993), op. cit. and Pearce and Warford.

(1993), op. cit.

43. The description of marketable permits and market creation mechanisms has beendealt with extensively in recent OECD publications.

44. Tientenberg, T.H. develops a very interesting discussion about the emission trading case. See Tietenberg, T.H., op. cit. in Markandya, A. and S. Richardson (1992), op. cit.

45. At the State level, the United States has also applied a marketable permit system to address problems with water quality (State of Wisconsin). In addition, both Germany and the Netherlands are studying and debating implementation of similar instruments for water pollution abatement. See OECD, (1993), op. cit., chapter 3.

46. The secretariat has conducted a series of studies on this matter, using extra-budgetary funds contributed by certain governments. The first set of results of these studies has been published in *Combating global warming*, UNCTAD/RDP/DFP/1, 1992. Further studies are underway.

47. In the case of a deposit-refund system for beverage containers, the internalization of the externality is achieved by giving bottle users an incentive to return the bottle for re-use or recycling, so that the deposit can be refunded. The deposit-refund system can be allocatively efficient and similar to a "Pigovian tax" (i.e., emission or product charges as discussed above), if the deposit is set at a level equal to the marginal social damage caused by the bottle not being returned.

48. Since 1988, the Republic of Korea has operated a deposit-refund system on food containers, tyres, batteries, lubricants, pesticide containers and plastics. See London Economics, "The potential for using market instruments for pollution control in developing countries", London, 1992. In the case of batteries with a high content of mercury and cadmium, Denmark, Finland, Norway and Sweden are examining the possible implementation of such systems.

49. See *Combating global warming*, op. cit., the monograph prepared by UNCTAD on this subject.

50. Exclusive because costs and benefits should accrue exclusively to the owner; transferable (from one owner to the other); and secure (from involuntary seizure by neighbours). See OECD, (1993), op. cit.

51. In Bangladesh, inland fishing grounds were auctioned to the highest bidder. However, as the auctions were annual, the short license period, with no assured renewal, led the owners to maximize revenue by allowing entry to as many fishermen as possible, and charging for entry. Hence overfishing (intertemporal externality) occurred. See Siddiqui, D., "Licensing versus leasing systems for government owned fisheries (Jalmahals) in Bangladesh". In Aguero, M. et al. (eds.), *Inland Fisheries Management in Bangladesh*, ILLARM, Manila, 1989.

52. Thus, the European Community is proposing that with respect to transport of oil by sea not only the shipowner but also the owner of the cargo should be financially liable for damage which the oil might cause, the aim being to incite the owner of the oil to choose reliable ships.(see *Le Courrier* (Geneva) 27 January 1993).

53. An extreme perverse example was that of Brazil, where it has been at times the case that it was necessary to burn down the forest in order to claim it. (See T. Sterner, in *Economic Instruments for Environmental Management in Developing Countries*, OECD 1993, p.57.)

54. As argued recently by Ostrom, the failure to explain how indigenous people manage to use certain natural resources sustainably invalidates the assumption that privatization or state control are the only panacea for governing the commons. See Ostrom, E., *Governing the commons*. Cambridge: Cambridge University Press, 1990.

55. Australia, the United Kingdom, Norway, Sweden, Finland and the United States have been reported in various OECD sources to apply variations of performance bonds and non-compliance fees. In Malaysia, performance bonds were introduced in the 1960s for mine rehabilitation. The amounts required ranged from US$1,000 per acre in Jahore, to US$5,000 in Kuala Lumpur and Selengor. See Pearce, D.W., (1993), op.cit.

56. For example, and as regards education and training programmes, German development cooperation institutions are already developing two training programmes with the Industrial Board and the Ministry responsible for environmental issues in Chile. As a basis for applying economic instruments to further improve environmental quality, cost-recovery for waste water management is being addressed. See Hortsmann, K., "Economic instruments for environmental protection, status and trends in German Development Assistance", for the Federal Ministry for Economic Cooperation (BMZ) of Germany, in OECD, (1993), op. cit., chapter 4.

57. Rio Principle 10 reads as follows: "Environmental issues are best handled with the participation of all concerned citizens, at the relevant level. At the national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities, and the opportunity to participate in decision-making processes. States shall facilitate and encourage public awareness and participation by making information widely available. Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided."

58. See Tobey, J.A., "The Integration of Economic and Environmental Policies in Natural Resource Management: Views from the OECD", paper prepared for an international expert meeting on strategies for sustainable resource management and resource use, Neorwijk, The Netherlands, June 3-4, 1993.

59. Schmidheiny, op. cit., p.23.

60. E.g. in Article 6 of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, in Article 1 of the London Guidelines for the Exchange of Information on Chemicals in International Trade (Decision 15/30 of the Governing Council of UNEP, 25 May 1989) or in Article 9 of the International Code of Conduct on the Distribution and Use of Pesticides (as adopted by the 25th Session of the FAO Conference in November 1989).

61. For an interesting approach on the case of Africa, see Lange, G.M., and Duchin, F., "Integrated environmental-economic accounting, natural resource accounts, and natural resource management in Africa. Draft prepared for the Bureau for Africa, ARTS/FARA as part of a study supported by the Environmental Policy Analysis and Training Project of USAID. Institute for Economic Analysis, New York University, New York, May 1993.

62. Rio Principle 13 reads as follows: "States shall develop national law regarding liability and compensation for the victims of pollution and other environmental damage. States shall also cooperate in an expeditious and more determined manner to develop further international law regarding liability and compensation for adverse effects of environmental damage caused by activities within their jurisdiction or control to areas beyond their jurisdiction."

63. Rio Principle 15 reads as follows: "In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation."

64. See e.g. "Responsible Care, A chemical industry commitment to improve performance in health, safety and the environment", CEFIC, European Chemical Industry Council, Brussels, document CEFIC 5/1993.

65. Adopted in July 1986 for recommendation to members.

66. As of October 1993.

67. In 1974, a Compensation Fund was created in Japan by the "Pollution-Related Health Damage Compensation Law" to compensate sufferers of pollution-caused illnesses. In the Republic of Korea, an Environmental Pollution Prevention Fund is ifunctioning, financed by government funds, as well as by fines or charges levied on polluters exceeding emission standards. An Environmental Fund was launched in Thailand, in 1991.

68. The first three of these criteria are suggested in OECD, "Guidelines and Considerations for the Use of Economic Instruments in Environmental Policy", Annex to the Recommendation of the Council on the Use of Economic Instruments in Environmental Policy, adopted by the OECD Council at its 750th Session on 31st January 1991.

69. Rio Principle 7 reads as follows: "States shall cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth's ecosystem. In view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. The developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and of the technologies and financial resources they command."

70. Rio Principle 8 reads as follows: "To achieve sustainable development and a higher quality of life for all people, States should reduce and eliminate unsustainable patterns of production and consumption and promote appropriate demographic policies."

71. The stages approach is based on elaboration from Panayotou, T., "Economic incentives for environmental management in developing countries", in OECD, (1993), op. cit., chapter 2, as well as other recent OECD sources.

72. See Demsetz, H., "Towards a theory of property rights", *American Economic Review*, Vol. 57, 1967. For a very pertinent discussion on "Demsetz views" and the potential gains to cooperation see, Barrett, S., "The problem of global environmental protection", *Oxford Review of Economic Policy*, Vol. 6, No. 1, 1990.

73. Other variants are debt-for-sustainable-development-swaps whereby debt is swapped for a more general agreement to undertake actions beneficial to the environment. In addition, and for a discussion on ways of combining debt reduction with halting deforestation, see Bauer, A., and Illing, G., "Debt-for-nature-swaps: axing the debt instead of the forests", *Intereconomics*, January/February 1992.

74. The World Heritage Convention is unique among international environmental agreements for incorporating side payments. The Convention established a World Heritage Fund that is used to help protect mutual

environments of "outstanding universal value". See Barrett, S., (1990), ibid. See also WIDER, "The environmentand emerging development issues", Study Group Series No. 7 (1991), pp.15 ff.

75. By the time this paper is available to governments, the final shape of the GEF should be known. At the time of writing (late 1993), there was considerable controversy about several facets of the GEF as constituted in its initial "pilot version". In particular, many observers were posing questions about GEF's decision-making process; its institutional "home"; its relationship to the Commission on Sustainable Development; the meaning and implications of the "incremental costs" it is intended to finance; and whether the climate change and biodiversity conventions should be financed by GEF or have their own separate facilities. See *Developing Countries and GEF: For a Strategy of the South*. Geneva: South Centre, May 1993.

76. It can be constrained by problems of ownership, monitoring and measurement. In addition, the system is relevant primarily in terms of developed country commitments; developing countries are mainly involved in responding to proposals. It is unlikely to prove satisfactory in the long term.

77. This mechanism may also be applicable to other Conventions such as the Biodiversity Convention, although the precise equity and efficiency implications need to be more thoroughly looked at. For a very interesting proposal on this issue see, Environmental Defense Fund, "Sustainable development through trade in environmental commodities", New York, 1993.

78. See *Combating global warming*, op. cit., the monograoh prepared by UNCTAD on this subject.

79. E.g., as espoused by the OECD: see *Taxation and the environment: complementary policies*, OECD 1993, p.69.

80. *ibid.*

81. See Chichilnisky, G., and G.M. Heal, "Market instruments for environmental policy", Columbia University, September 1993; and Hoel, M., "Efficient international agreements for CO_2 control", *Energy Journal*, 12:2, 1991. See also for a general discussion on this issue, Grubb, M., "Options for an international agreement", in UNCTAD/RDP/DFP/1, (1992), op. cit.

82. The strong negative impact of pesticides on biodiversity, increasing pest resistance or producing direct health hazards, is already well known, and determinants inherent or external to the production and processing of commodities have been identified as well in recent research. In addition, pollution problems of mineral exports, forest clearance for croplands and grasslands, and fish catch levels which sometimes exceed regeneration thresholds tend to be significant.

83. The authors of the study suggest the use of the "Non-Polluter Gets Paid Principle" to compensate commodity exporting countries who are currently subsidizing consumers by freely exporting often irreplaceable natural capital. See Linneman, H., Kox, H.L.M., van der Tak, C.M., and A.P.M. de Vries, "Preliminary conditions for international commodity-related environmental agreements. Results of a pre-feasibility study". Research Project on International Commodity-Related Environmental Agreements (ICREA), Faculty of Economics and Econometrics, Free University of Amsterdam, January 1993.

84. Note that this does not refer to low prices caused by prevailing supply and demand conditions on the markets for commodities, which is an entirely separate issue.

85. In contrast with what happens with aid for development, in which if no mechanisms for internalization are devised, such aid results in many cases in the perpetration of the externalization of external costs. See Taylor, R., "Positive incentives, sustainable commodity production and the OECD. A constructive approach to the integration of trade, environment and development policies", Paper presented at the OECD's Trade and Environment Seminar, 30 June 1993.

86. See, Pearce, D.W., (1993), op. cit., pp.44.

87. In the late 1980's, about half of all developing countries' exports still comprised fuel, minerals and other primary commodities. Thus, trade distortions reduce developing countries' export revenue, and for this reason, the funds available to introduce environmentally improved methods of production. See Repetto, R., (1993), op. cit.

88. This is, however, by no means a certain outcome of such internalization: the dynamic effects of incentives for internalization and the use of "clean technologies" may result in cost savings, rather than increases. A vast industry has been spawned by the search for technologies which would have these characteristics.

89. See the views cited in "UNCTAD's contribution within its mandate, to sustainable development: trade and the environment. Trends in the field of trade and environment in the framework of international cooperation". Report by the UNCTAD secretariat, TD/B/40(1)/6, August 1993.

90. For more details about the school of thought which in the United States supports the use of countervailing duties to achieve environmental goals, see Congress of the United States, "Trade and environment, conflicts and opportunities", 1992, p.92. See as well Housman, R.F., and D.J. Zaelke, "Making trade and environmental policies mutually reinforcing: forging competitive sustainability", mimeo, Center for International Environmental Law (CIEL), Washington, February 1993.

91. For a complete discussion on the inappropriateness of the use of trade restrictive measures for environmental purposes see UNCTAD, TD/B/40(1)/6, op.cit., pp.22-24, August 1993. See also Repetto, R., (1993), op.cit.

92. The concept of environmentally-sound technologies (ESTs) is a broad one. In general terms, ESTs protect the environment, are less polluting, use all resources in a more sustainable manner, recycle more of their wastes and products and handle residual wastes in a more acceptable manner than the technologies for which they were substitutes. See UNCED. *Agenda 21*. Geneva: United Nations, 1992, p. 2.

93. Under the framework convention on climate change, the parties are committed to "promote and cooperate in the development, application and diffusion, including transfer, of technologies, practices and processes that control, reduce or prevent anthropogenic emissions of greenhouse gases" (Article 4,. The Convention on Biological Diversity is even more explicit, stating that technologies relevant to the conservation and sustainable use of genetic resources "shall be provided and/or facilitated under fair and most favourable terms, including on concessional and preferential terms when mutually agreed". It also states that transfer of patent protected technology will be "consistent with the adequate and effective protection of property rights.

94. Many technologies for recycling and waste recovery reduce the raw materials requirement and lead, as well, to the production of profitable by-products. An illustration is the case of the REFIMET mine in Chile, which has developed a successful process to clean arsenic-rich concentrates. The

process is so successful that in addition to processing Chilean ores, REFIMET imports concentrates from the Philippines and Greece. An increasing proportion of this by-product, arsenic trioxide, is being exported to the United States at a profit. See Warhurst, A., "Environmental degradation from mining and mineral processing in developing countries: corporate responses and national policies", OECD Development Center, 1993.

95. In the case of commodities, the price is a small part of the total retail price of the commodity, a fact which may induce many vertically integrated producers to absorb the environmental premium with little or no price rise to consumers.

96. In a recent study, Pearce reports how several brands of coffee are now being sold where the producers receive higher than world market prices, but the retail price remains competitive with other coffee brands. These schemes include Max Havelaar in The Netherlands, and Cafedirect in the United Kingdom. See Pearce, D.W., (1993), op. cit., pp. 56.